

# **Mars Science Laboratory Entry, Descent and Landing Terminal Descent Strategy and Challenges**

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## **ABSTRACT**

In 2012, the Mars Science Laboratory (MSL) mission will pioneer the next generation of robotic Entry, Descent, and Landing (EDL) systems by delivering the largest and most capable rover to date to the surface of Mars. In accomplishing this EDL, a unique approach to terminal descent is used which culminates in a soft landing maneuver called the Sky Crane which delivers the rover to the surface on its wheels thereby eliminating the need for complicated and risky post-landing egress maneuvers. This phase of EDL is referred to as Powered Flight and begins when the Powered Descent Vehicle (PDV), consisting of the Rover and Descent Stage which is a support structure housing eight hydrazine engines, fuel tanks, radar, and inertial measurement unit separates from the aeroshell which had been protecting the PDV during entry. Through a planned path and altitude error correction opportunities, the PDV makes its way to short distance above the surface where the rover is lowered on a winch-like tether and set down on the surface. Once the Rover is on the surface, the tether is cut and the Descent Stage performs a fly-away maneuver and impacts the surface at a safe distance from the Rover. This paper discusses the MSL Powered Flight architecture, its key features and benefits, and highlights some of the challenges faced in delivering the Rover to the surface of Mars.